Wheat Varieties Work Report (Task 1)

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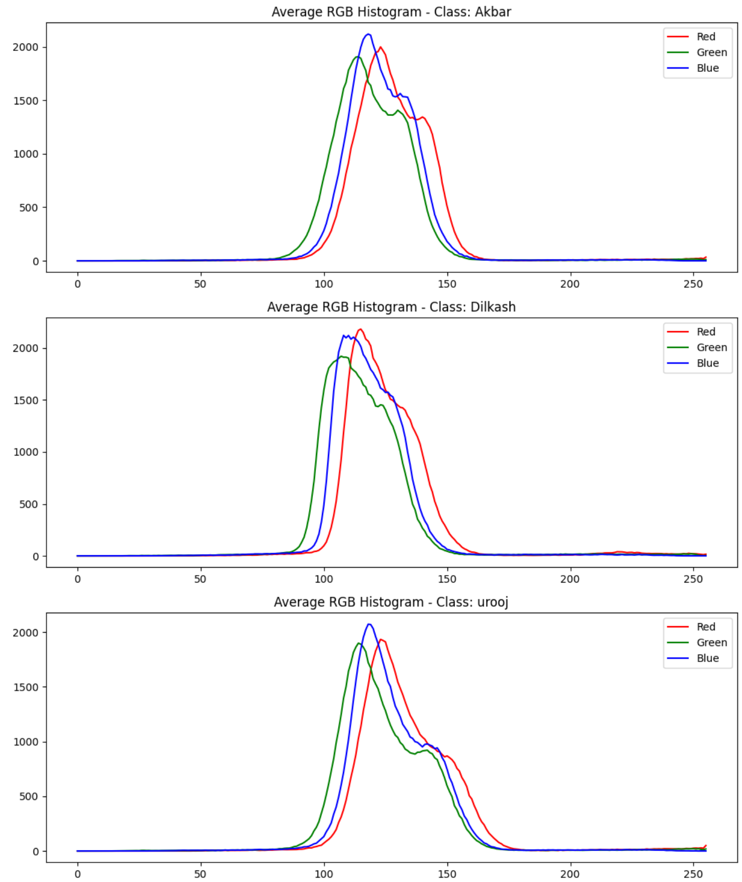
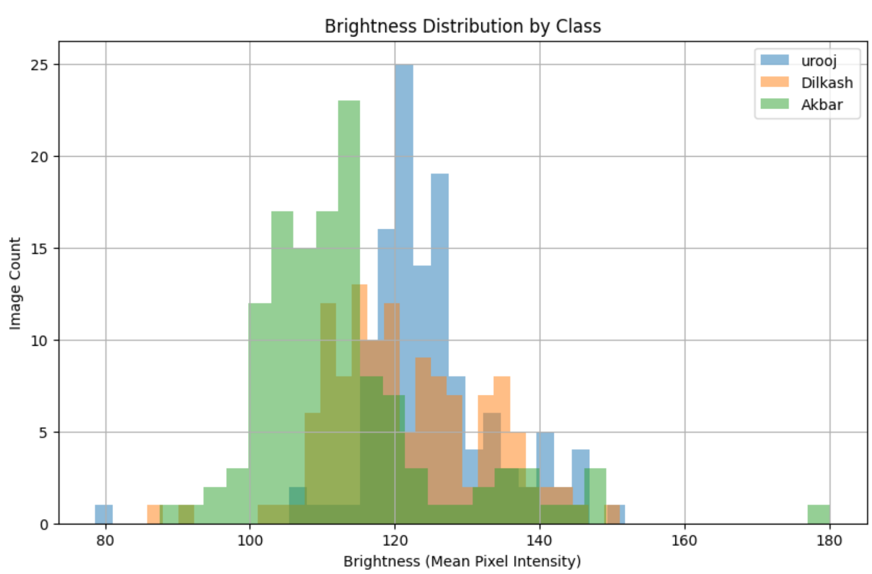
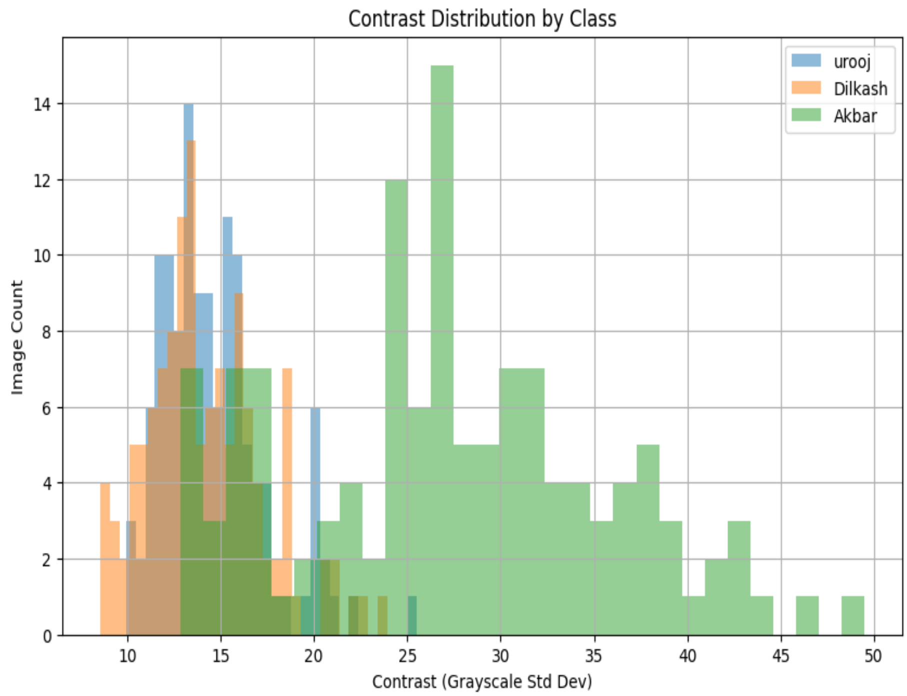
Histogram by class based on RGB:



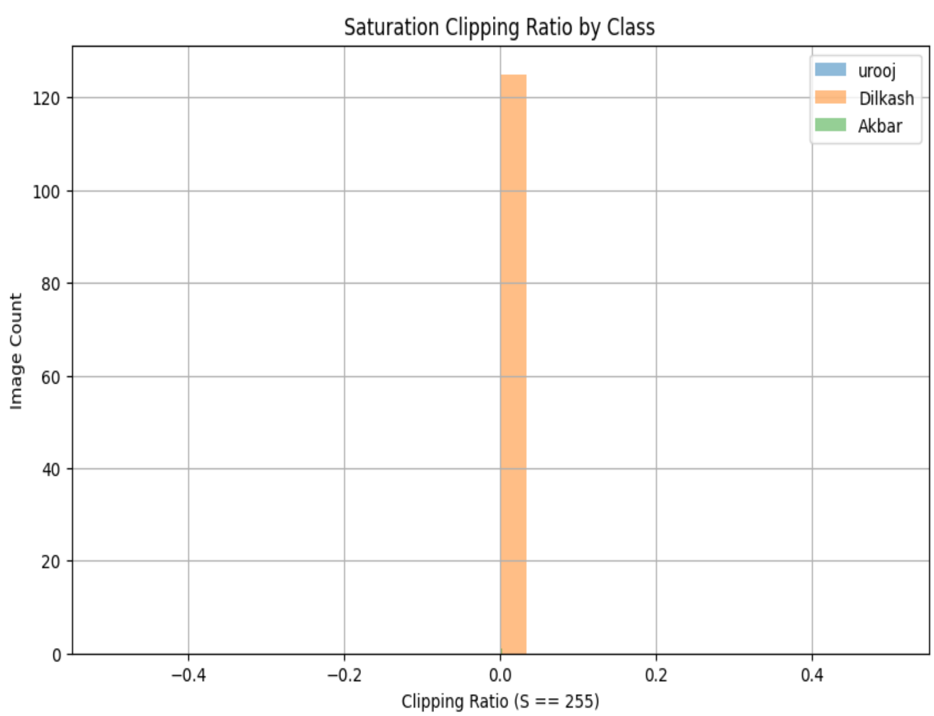
Histogram by class based on brightness:



Histogram by class based on contrast:

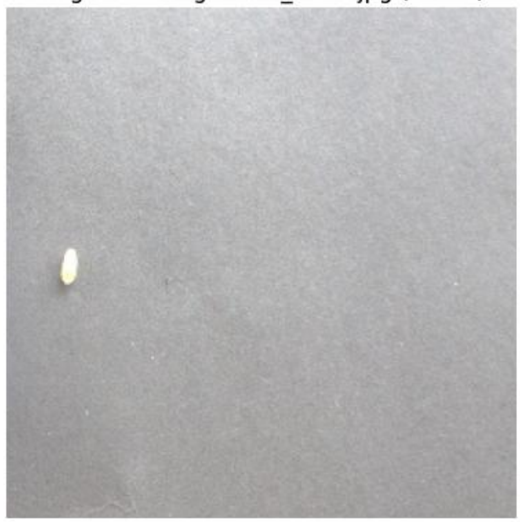


Histogram by class based on Saturation clipping:



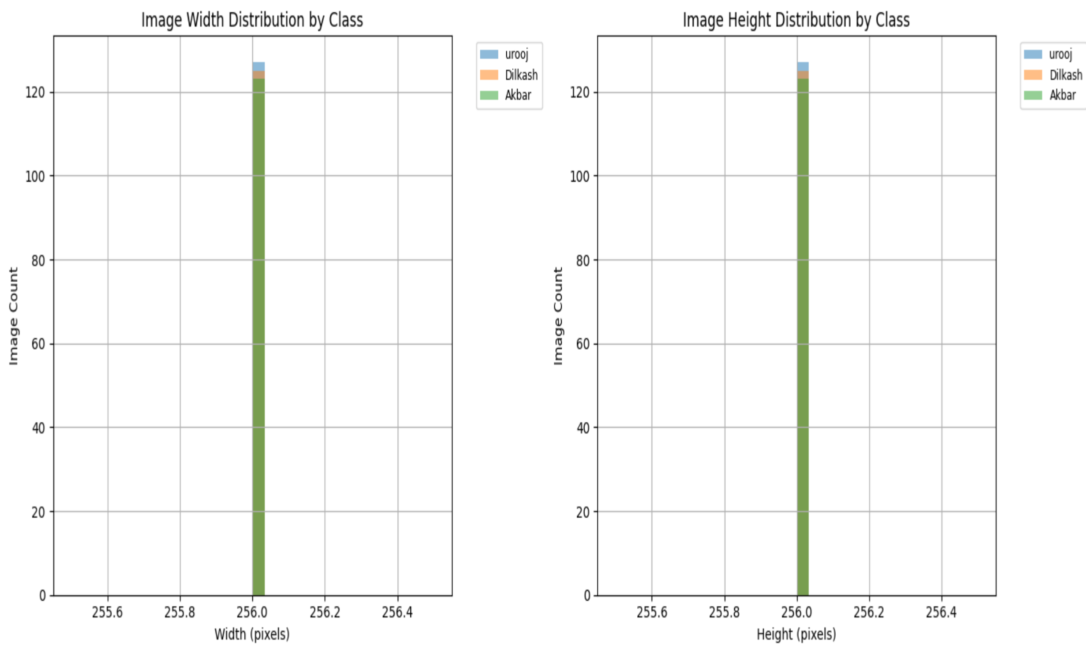
Brightest and Darkest image:

Brightest Image: IMG_0775.jpg (Akbar)

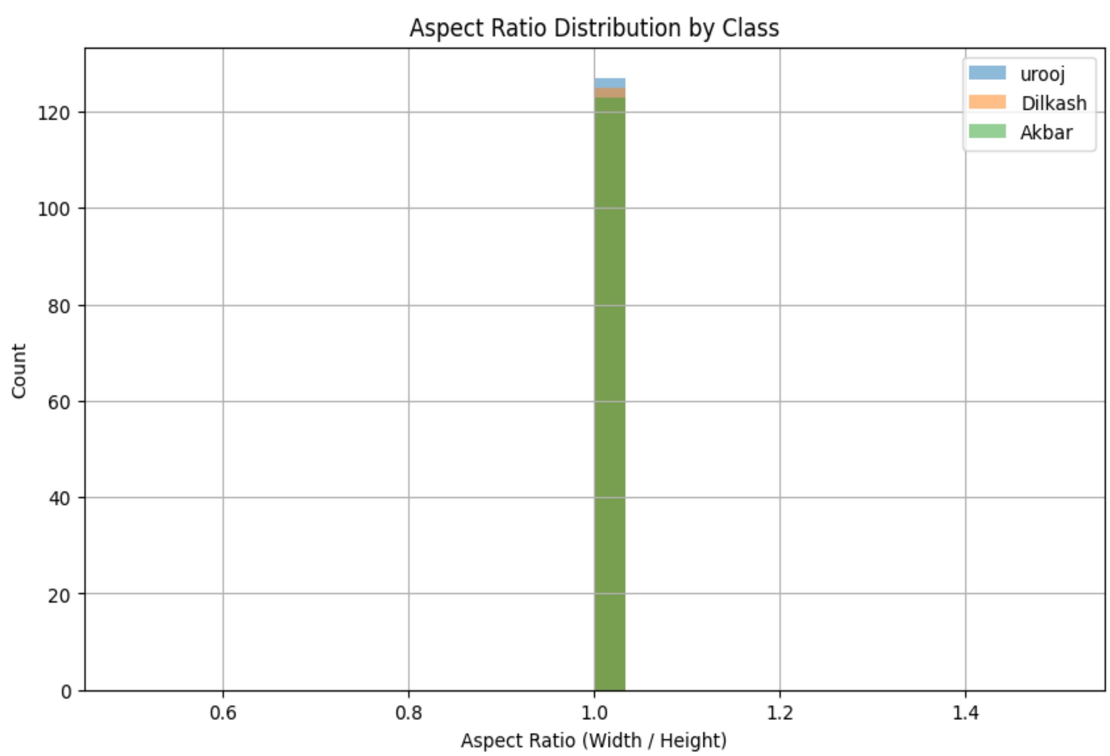


Darkest Image: urooj1 (337).jpg (urooj)

Histogram by class based on resolution:

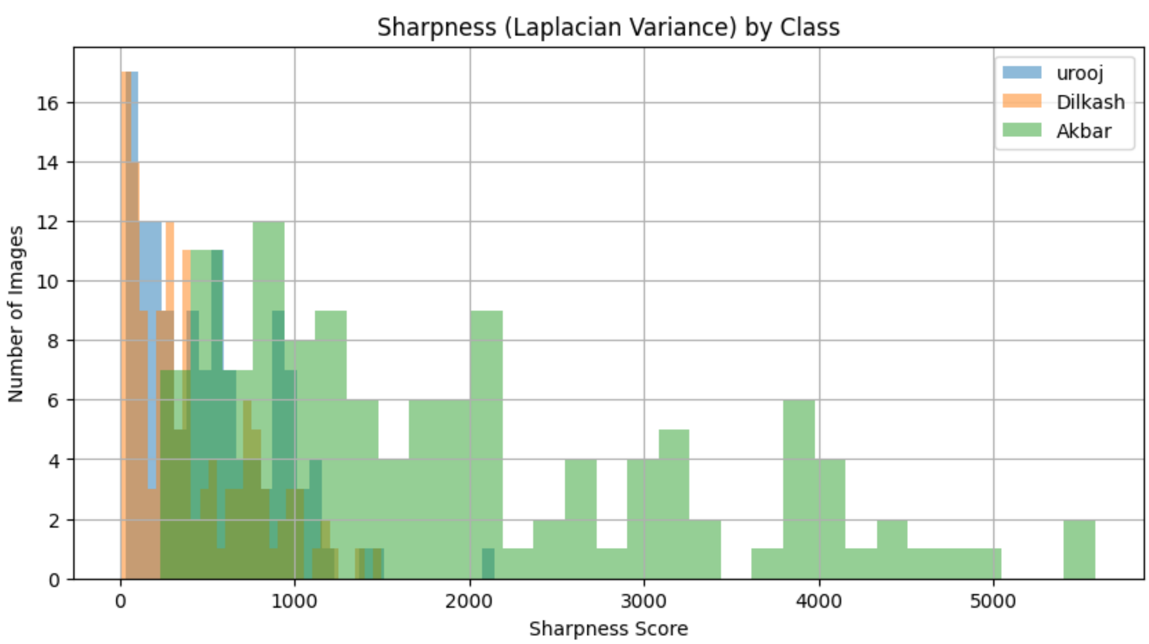


Histogram by class based on aspect ratio:

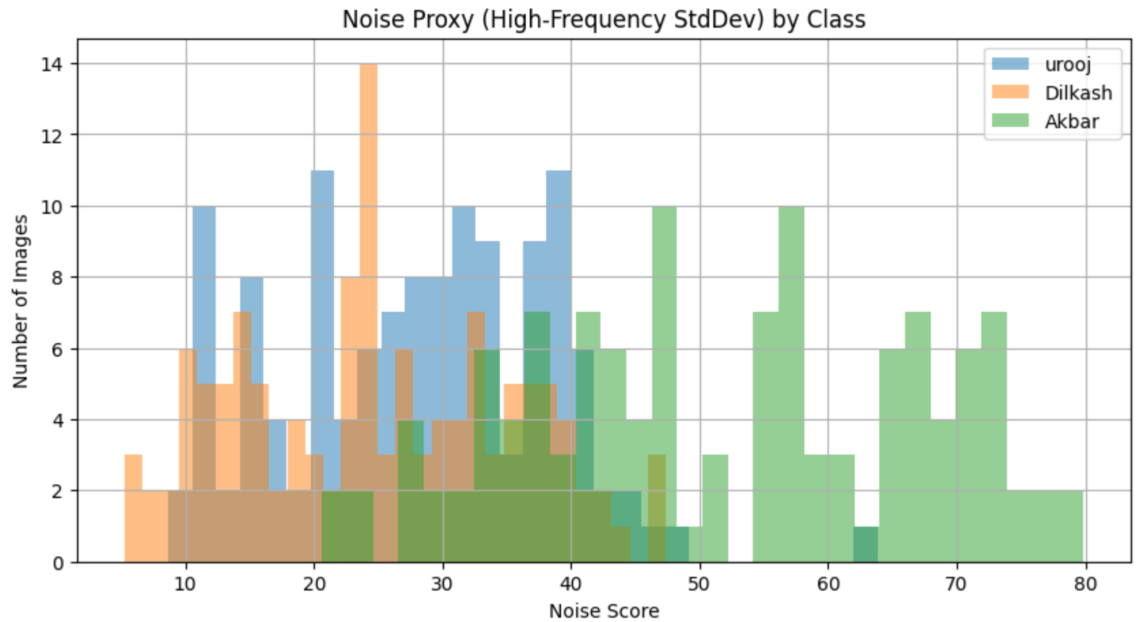


Classwise resizing and padding strategy:

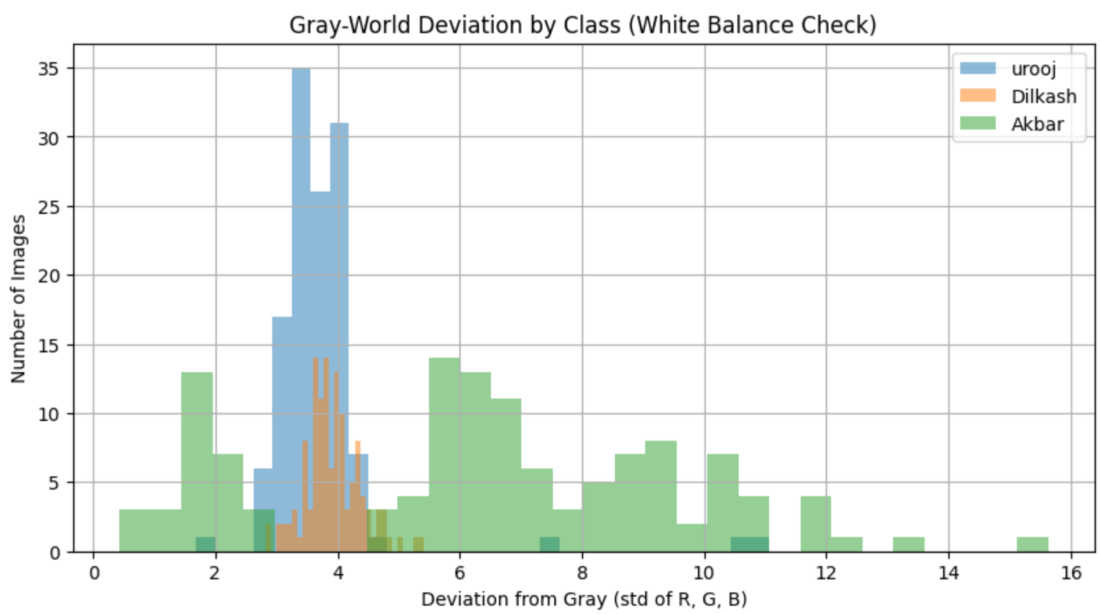
Histogram by class based on sharpness:

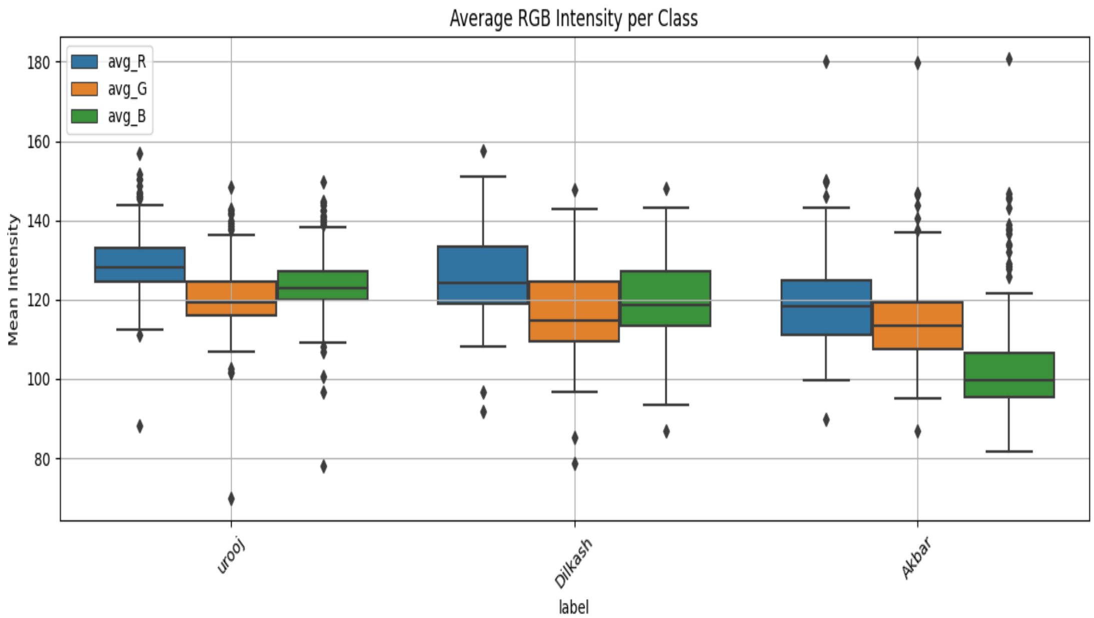


Histogram by class based on noise proxy:



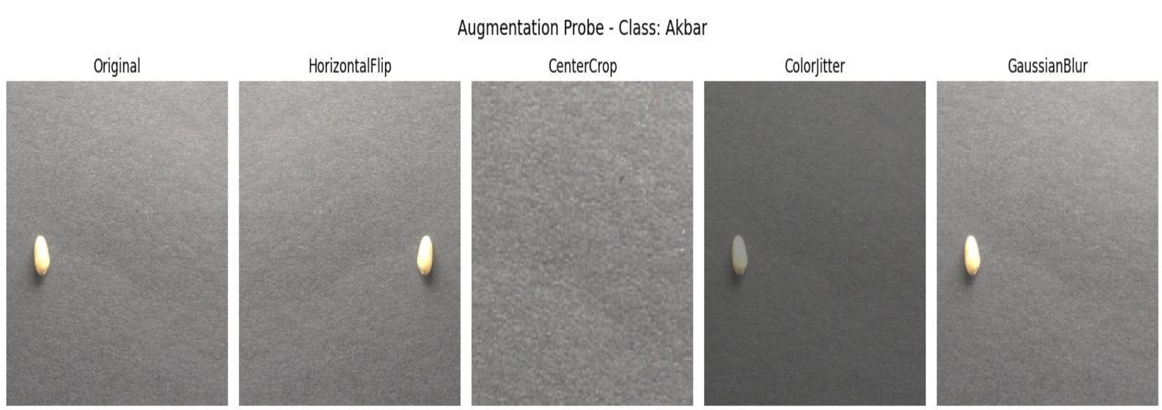
Histogram by class based on gray world deviation:

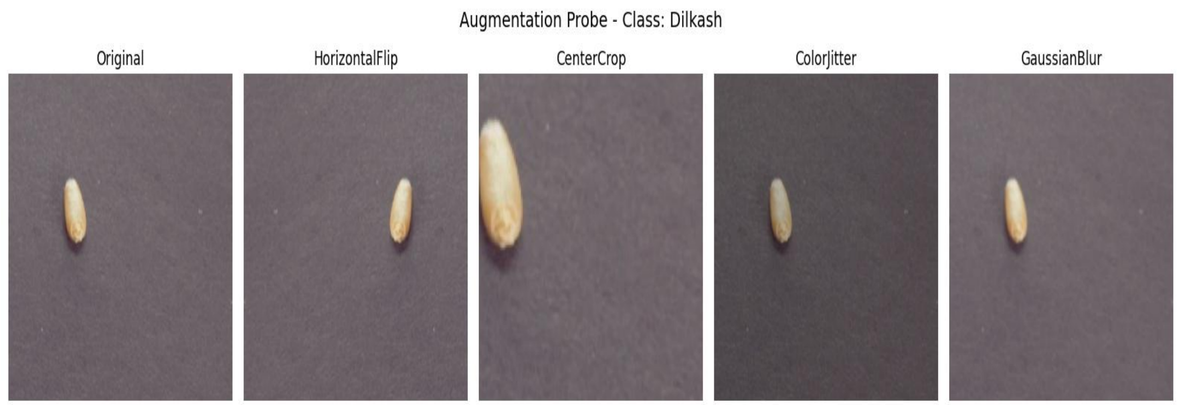


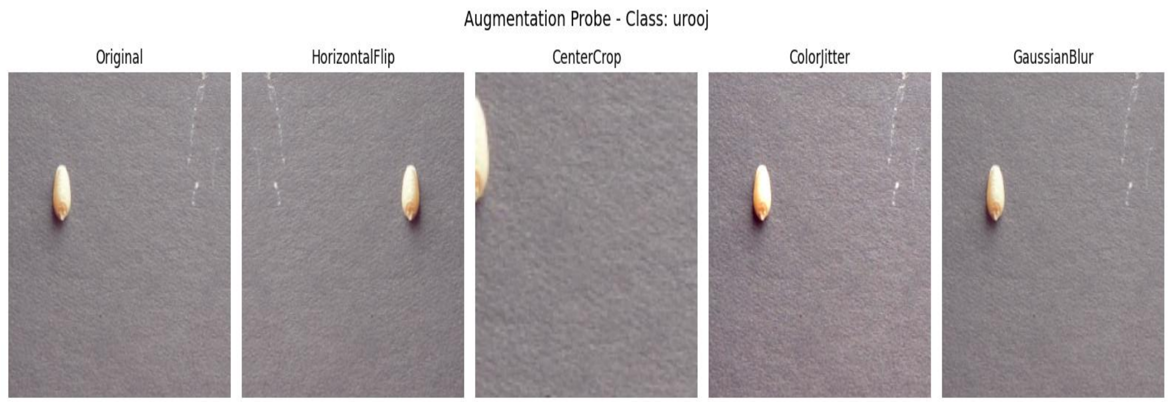


Show duplicates:

Augmentation probe:







Title	Dataset name & URL	Dataset description (samples, classes, Image per class or per split)	Methods Name	Accuracy of the model	Pros	Cons	Citation

Research on grading detection of the wheat seeds	https://pmc.ncbi.nlm.nih.gov/articles/PMC4032770/?utm_source	photos of wheat seeds with a camera and tested a small sample of 14 seeds divided into thre	basic image-processing and a decision method called AHP (Analytic Hierarchy Process) to classify the seeds.	95% accuracy in their small test.	approach is simple, low-cost, and easy to understand.	very small and not shared, so the results are hard to verify or generalize.	Han et al., “Research on grading detection of the wheat seeds,” The Scientific World Journal, 2014.

		e quality groups.					

“Wheat-Seed Variety Recognition Based on the GC_DRNet Model”	Self-constructed wheat-seed dataset	29 wheat-varieties × ~900 kernels each (collected outdoors on blue cardboard background), after filtering ~4,385 images retained; split into training/valid	GC_DRNet — a convolutional neural network built from a modified ResNet 18 with dense residua	test accuracy ~96.98%, precision ~97.02%, recall ~96.99%, F1	High recognition accuracy, model optimized for fewer parameters (11.65 MB) and lower	self-built and not publicly available (limiting reproducibility); collected under controlled conditions (blue background,	Xing X., Liu C., Han J., Feng Q., Lu Q., Feng Y. “Wheat-Seed Variety Recognition Based on the GC_DRNet Model.” *Agriculture*, 2023, 13(11), 2056; doi:10.3390/agriculture13112056.

		ation/test in ratio 8:1:1.	l blocks and global context modules.	~96.98%.	computational cost, suitable for deployment on smart devices	specific lighting) which may limit real-world generalisation.	

wheat grain shape using digital imaging to help improve grain weight in	Genetic analysis of wheat grains using digital imaging and their relationship to enhance	Researchers imaged about 1,375 wheat seeds from 55 genotypes and measured their	SmartGrain image-analysis software and genetic association analysis	it focuses on trait analysis, not classification.	digital seed traits with genetics to support wheat-breeding improvement.	Small dataset and no public access or classification accuracy make results hard to	Ali et al., “Genetic analysis of wheat grains using digital imaging and their relationship to enhance

breeding.	grain weight	size and shape traits.				benchmark.	grain weight," Scientia Agricola, 2020

"Identification of varieties of wheat seeds based on multispectral imaging combined with improved YOLOv5."	self-constructed multispectral image dataset of wheat seeds and no public download URL is clearly provided.	19 spectral bands, later reduced to 3 optimal bands via a genetic algorithm fused into composite images of wheat seeds for variety	YOLOv5 enhanced with a CBAM (Convolutional Block Attention Module) and trained on fused multispectral images.	average precision of 99.38% on the test set, all above 90%.	rapid, non-destructive, high-accuracy variety identification of wheat seeds using multispectral imaging plus deep-learning.	may limit generalisability to more varied real-world settings.	Liu W., Liu Y., Hong F., Li J., Jiang Q., Kong L., Liu C., Zheng L. (2024). *Identification of varieties of wheat seeds based on multispectral imaging combined with improved YOLOv5.* Food Physics 2(1):100042. doi:10.1016/j.foodp.2024.100042.

		identification.					

High-throughput imaging and image-analysis pipeline for colour-based traits in a wheat breeding programme.	self-collected from multiple field trials and greenhouse experiments	greenhouse 72 plants and multiple field trials up to 74,880 plots, 288,680 images for traits like physiological yellowing, senescence, disease and	RGB cameras + open-source image-analysis (ImageJ/Fiji) and developed a ground-based high-throughput imaging boom for plot-level capture.	r = 0.95 for greenhouse physiological yellowing; r = 0.88/0.86 for field canopy cover	rapid, objective, large-scale phenotyping of colour-based traits in field plots using low-cost hardware with strong trait heritability.	the methodology focuses on correlation rather than classification accuracy, which may limit transfer to more varied trait types	Walter J., Edwards J., Cai J., McDonald G., Miklavcic S., Kuchel H. (2019). *High-Throughput Field Imaging and Basic Image Analysis in a Wheat Breeding Programme.* Frontiers in Plant Science, 10:449. doi:10.3389/fpls.2019.00449.

		canopy cover					